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Digital Map Table and Fovea-Tablett®

Initial Situation

It is important in many domains today that the resource and mission planning for a specific geographic area is performed by a team. Examples can be found in the work of a crisis management team in the event of a disaster, the planning and supervision of state visits or major sporting events such as the Tour de France, or the sensor planning for the military and civil reconnaissance.
In all cases mentioned above, the team needs both an overview of the scene as well as technical detail views of the scene. Generally, GIS-based systems are used for the management of the required information; the presentation itself is realised by various techniques of visualisation. For the common scene overview, a presentation via beamer is mostly chosen, and tablet PCs are additionally used for the observation of details. However, the partitioned view of the required data impedes the acquisition of information for the user and thus unnecessarily increases the frequency of errors as well as the elapsed time. This becomes particularly critical when the people in charge are under extreme pressure to perform, as, for example, in the work of a crisis management team.

Solution

To resolve the above-mentioned problem, the Digital Map Table with Fovea-Tablett was developed at the Fraunhofer Institute (IOSB). It combines different visualisation techniques in a convenient way, such that each team member can grasp the necessary information »at a glance«. This resolves the problem of detail versus context as well as that of the technically necessary views. A large horizontal transmitted light display (table display) serves for the visualisation of a common overview. Tablet PCs with high pixel resolution can be placed on it arbitrarily.

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A patented method allows that each of the so-called Fovea-Tabletts visualises the underlying area instantaneously and thus a non-covering loupe is created. In addition to the local visualisation of detailed views, Fovea-Tabletts may also be personalised. Thus, for a situation analysis in the event of a disaster, Fovea-Tabletts will display a view for emergency forces that is different from that for the fire fighters. Furthermore, the Fovea-Tabletts may be used as a single-user workstation. For this purpose, the previously examined parts of the scene may be stored on the Tablet PC in order to process them outside the Digital Map Table. Arbitrary tools may be installed and used on the tablet PC.

The user interacts with the system by electronic pen, mouse or gesture. Examples of such interactions are the annotation of scenes and the retrieval of additional information. The additional information is displayed either on the tablet PC itself or, if of relevance for the entire team, on a vertically mounted large display (see image above). The spectrum of additional information comprises textual information, images, 3D views, videos as well as the display of image streams recorded by a web cam.

System Architecture

Currently, the visualisation on the horizontal displays (table display, Fovea-Tabletts) uses NASA World Wind as GIS viewer and a UMN Map Server for data storage. The data exchange is carried out by the standardised web services WMS and WFS. In addition, a Java-based component implements the visualisation of information on the vertical display. However, to apply the Digital Map Table with Fovea-Tabletts for a broad spectrum of applications, The complete system is based on highly modular system architecture (see following grafics).

The GIS viewer or the geo data base (Map Server) may thus be upgraded or replaced by custom specific components with low implementation effort. Custom specific data bases may be integrated either through the Map Server of the Digital Map Table or directly, if the data is made available via WMS/WFS. The integration of further software tools is also possible. This high modularity is enabled by an operating system independent middleware, which was developed at Fraunhofer IOSB. This middleware supports the communication between different applications via an I/O server and I/O clients independently of the used hardware devices. A common look and feel is ensured by an ergonomic Human-Machine-Interface including gesture.